

Passive Devices for Advanced Fluid Management aboard Spacecraft, Phase I

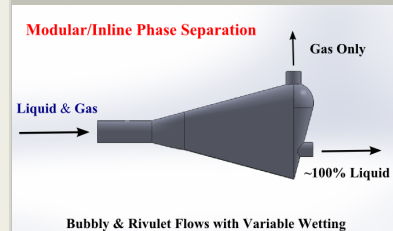
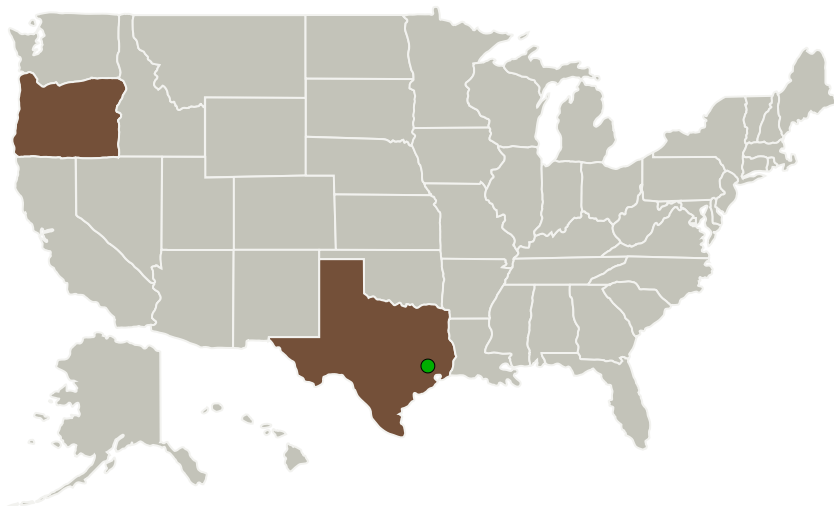
Completed Technology Project (2013 - 2013)



Project Introduction

Acute challenges are faced by the designers of fluid systems for spacecraft because of the persistently unfamiliar and unforgiving low-g environment. For example, most fluid systems aboard spacecraft are impacted by the presence of capillary forces—a poor understanding of which has led to poorly performing life support equipment. Despite an increasing number of flight investigations concerning capillary phenomena, no broad re-assessment and re-design of low-g fluids systems has been undertaken. We propose a fundamental change to spacecraft fluid systems design. In this Phase I research, concurrent with a modern review of all candidate spacecraft fluid systems, we will design and demonstrate two new geometric flow components for the critically and persistently problematic unit operations of in-line bubble and liquid rivulet separations. The new components can be exploited across a variety of spacecraft fluids systems to markedly increase system reliability and performance. Many other components are envisioned as inspired by recent results from space experiments and the application of novel geometries. Such components offer the advantages of no power, no moving parts, and little to no pressure loss as they passively separate fluid phases using capillary forces and motive fluid streams.

Primary U.S. Work Locations and Key Partners



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Table of Contents

Project Introduction	1
Primary U.S. Work Locations and Key Partners	1
Project Transitions	2
Images	2
Organizational Responsibility	2
Project Management	2
Technology Maturity (TRL)	2
Technology Areas	3
Target Destinations	3

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Organizations Performing Work	Role	Type	Location
Irpi, LLC	Lead Organization	Industry	Wilsonville, Oregon
● Johnson Space Center(JSC)	Supporting Organization	NASA Center	Houston, Texas

Primary U.S. Work Locations	
Oregon	Texas

Project Transitions

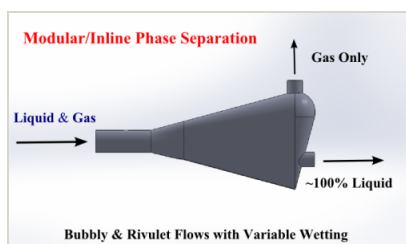
May 2013: Project Start

November 2013: Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/140701>)

Images



Project Image

Passive Devices for Advanced Fluid Management aboard Spacecraft
(<https://techport.nasa.gov/image/135042>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Irpi, LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

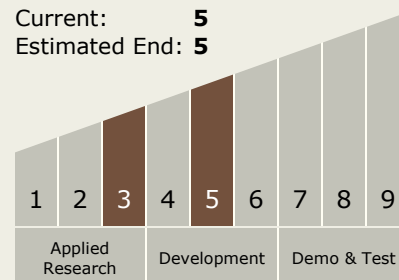
Carlos Torrez

Principal Investigator:

Ryan Jensen

Technology Maturity (TRL)

Start: **3**
Current: **5**
Estimated End: **5**



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Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
 - └ TX06.1 Environmental Control & Life Support Systems (ECLSS) and Habitation Systems
 - └ TX06.1.2 Water Recovery and Management

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System